An AO Survey of the First Sample of Debris Disk Stars from WISE

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Collaborators:

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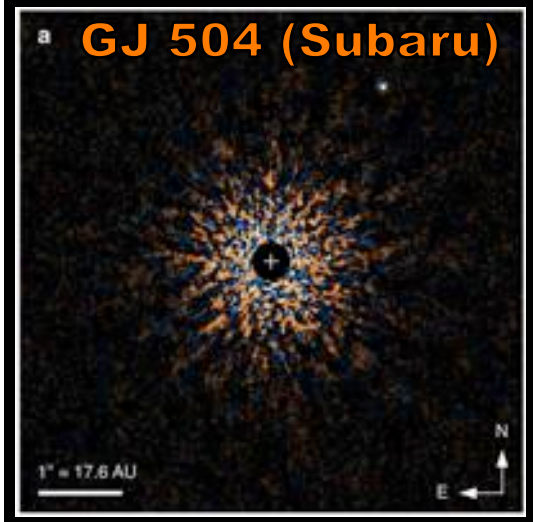
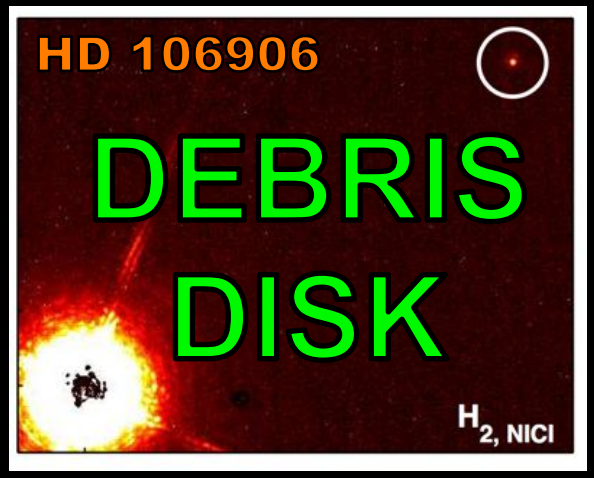
Overview

1. A New VLT/Keck Survey for Exoplanets.

2. Other Debris Disk work.

Exoplanet Imaging in 2014

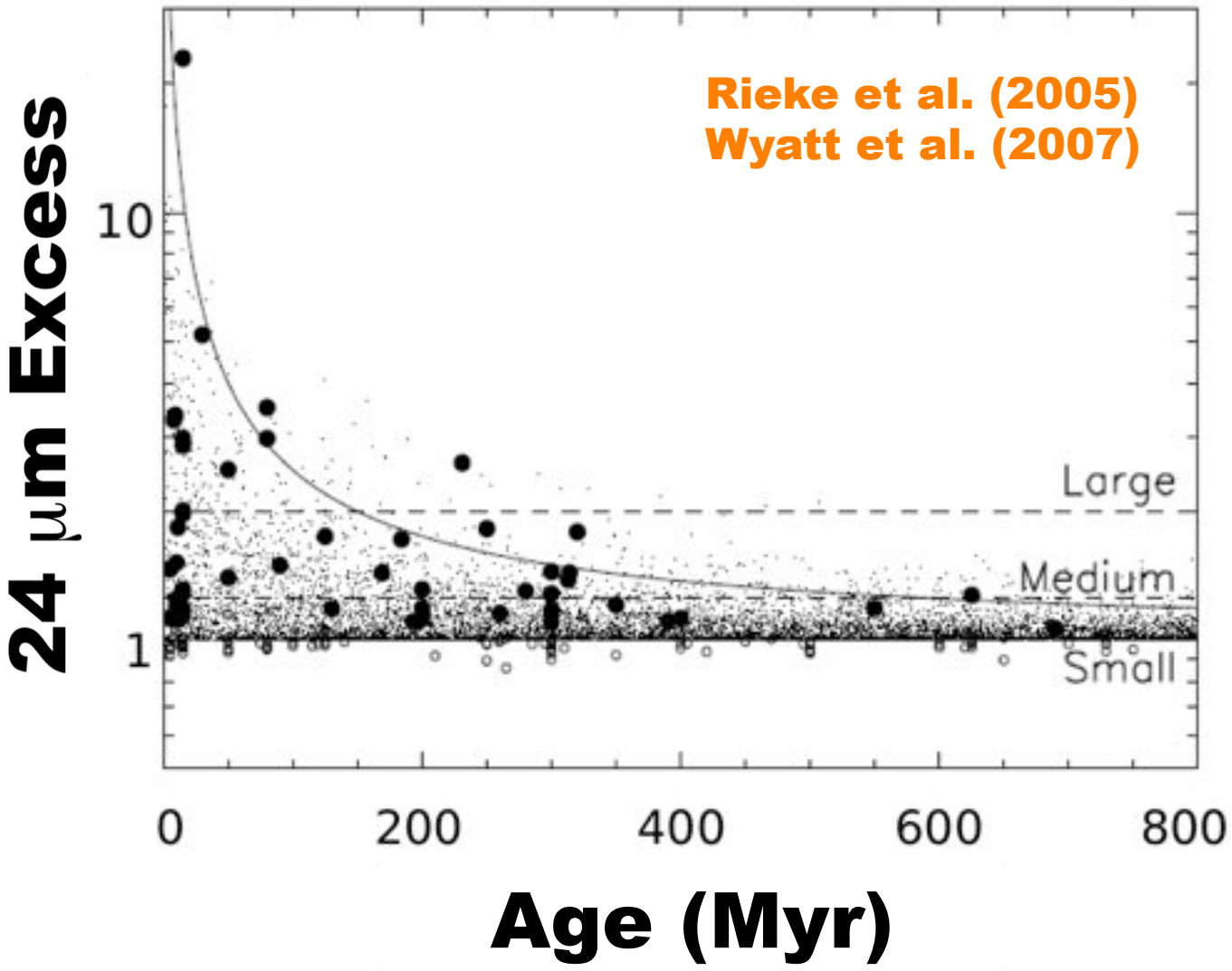




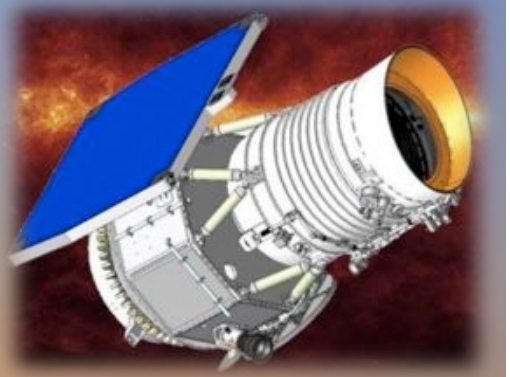
Does Debris Signal Planetary Systems?

- **Bright dust may indicate planetesimal stirring by larger bodies.**
- **Debris Disks are sculpted by planets: β Pic, HR 8799, Fomalhaut.**
- **24 μm excess reveals stellar youth.**

Warm Debris Dust Traces Stellar Youth: The Trend for A-type Stars



High Contrast Imaging Follow-up to WISE Debris Disks



- **WISE all sky survey: 3, 5, 12, 22 μm.**
- **Hundreds of new 22 μm excess stars (e.g. Patel et al 2014)**

Overview

1. A New VLT/Keck Survey for Exoplanets.

2. Upcoming Debris Disk work.

A VLT/Keck Survey of Newly Identified Debris Disk Stars

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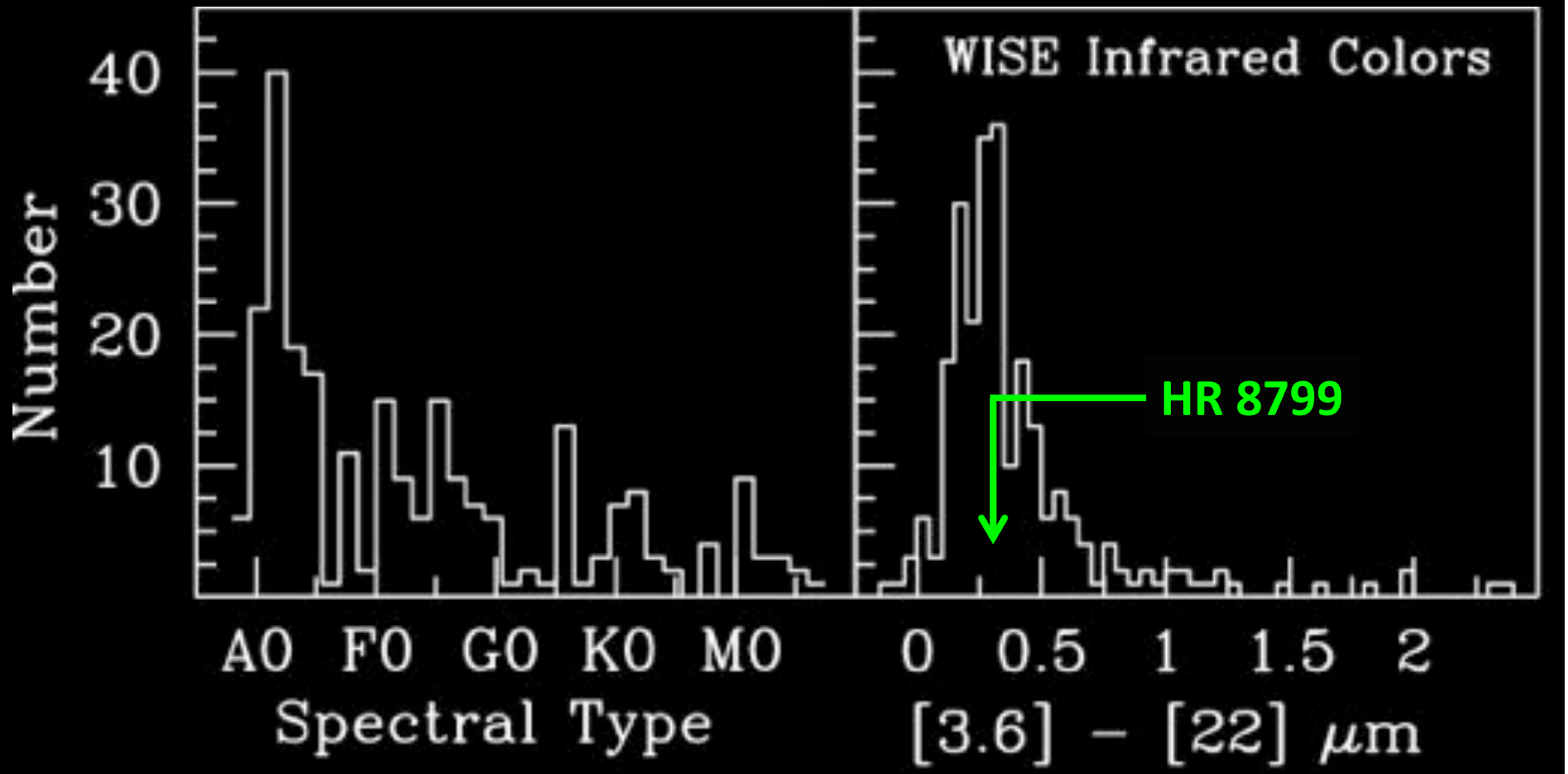
High Contrast Surveys for Exoplanets

Survey	Telescope	Number of Stars
GPI/SPHERE	Gemini-S, VLT	~600
SEEDS	Subaru	~300
This Survey	Keck/VLT	262
NICI	Gemini-S	218
IDPS	Gemini/VLT	~200
LEECH	LBT	135
NACO Large Program	VLT	86

Survey Specifics



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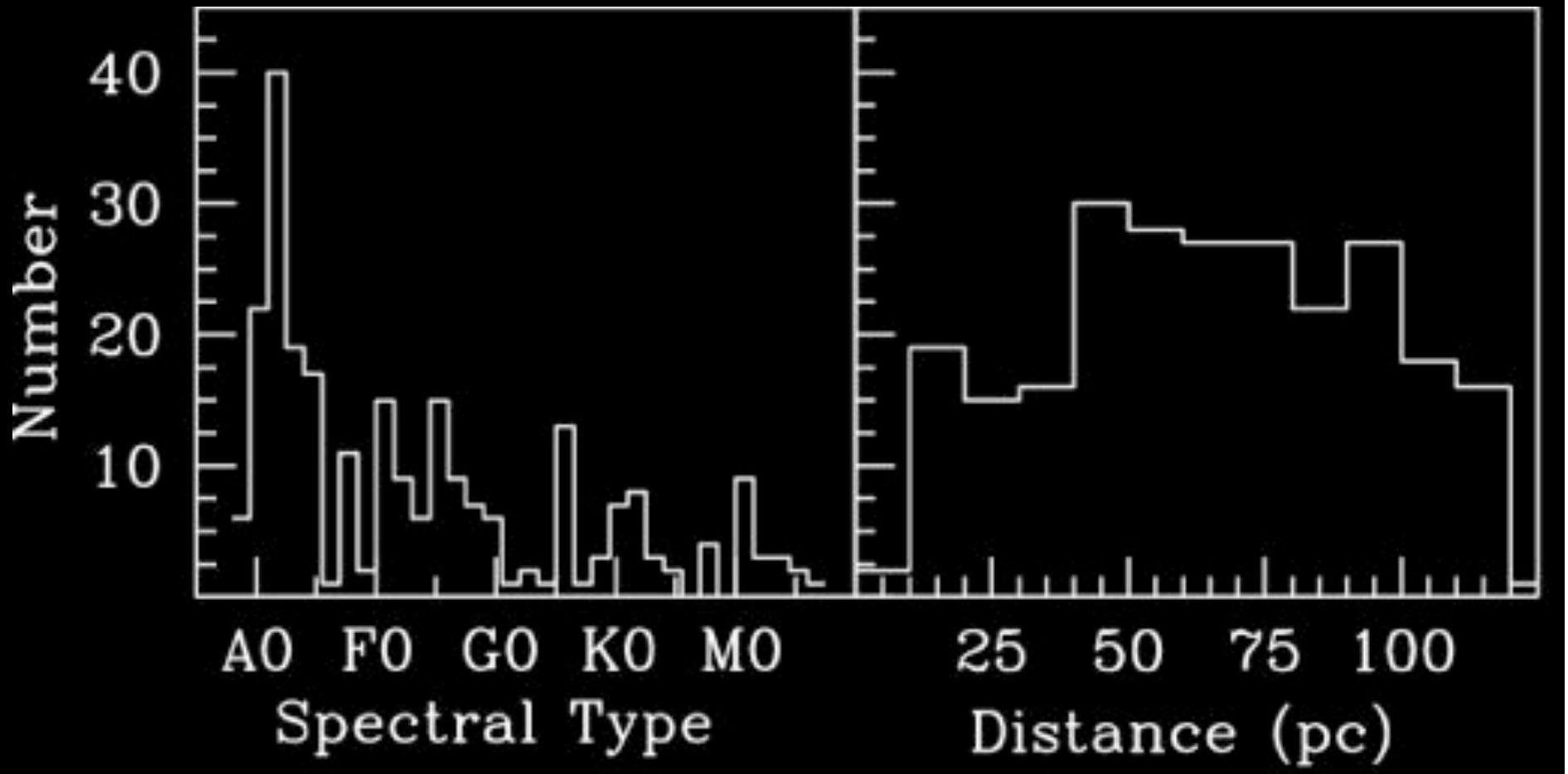

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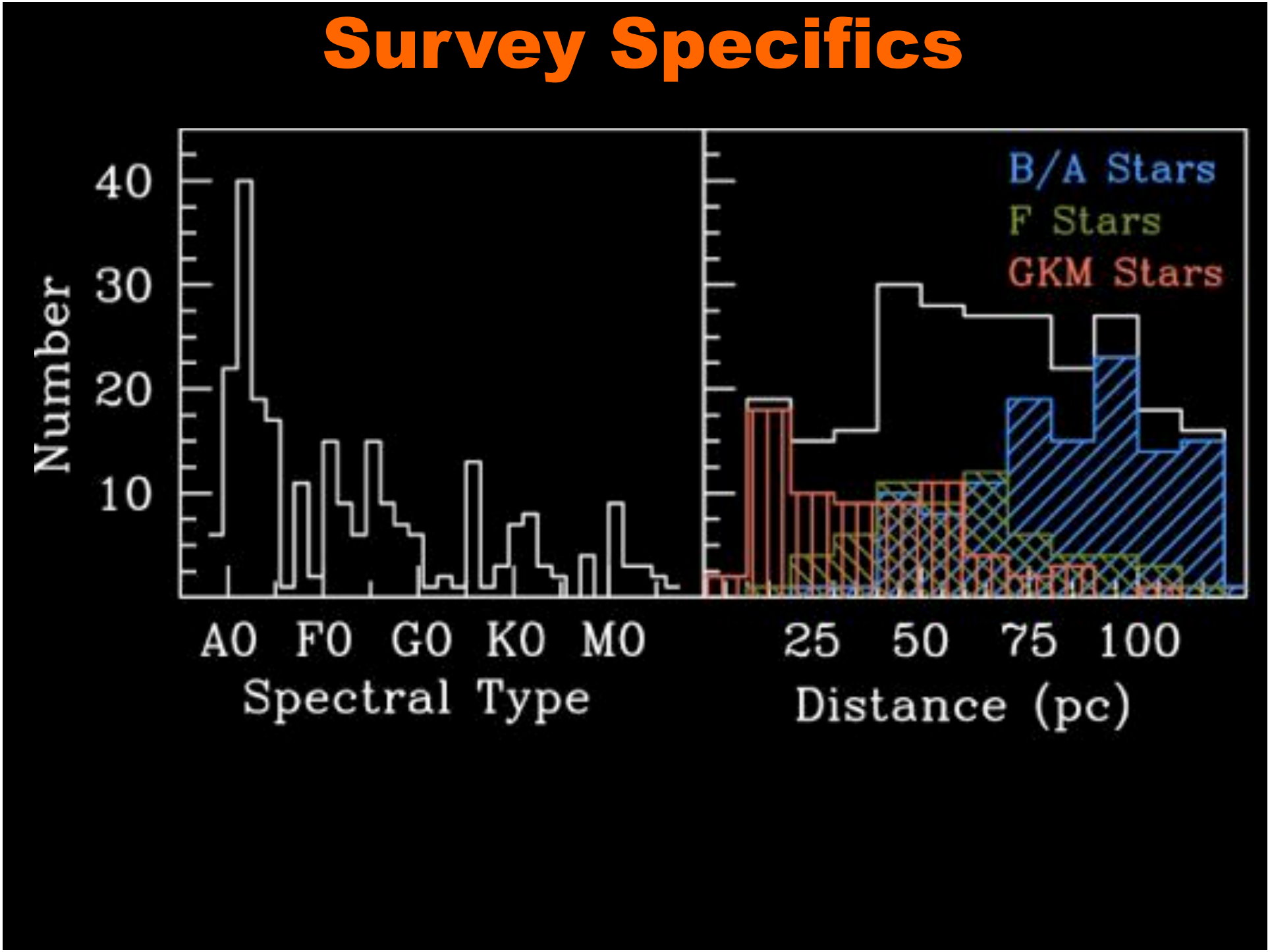
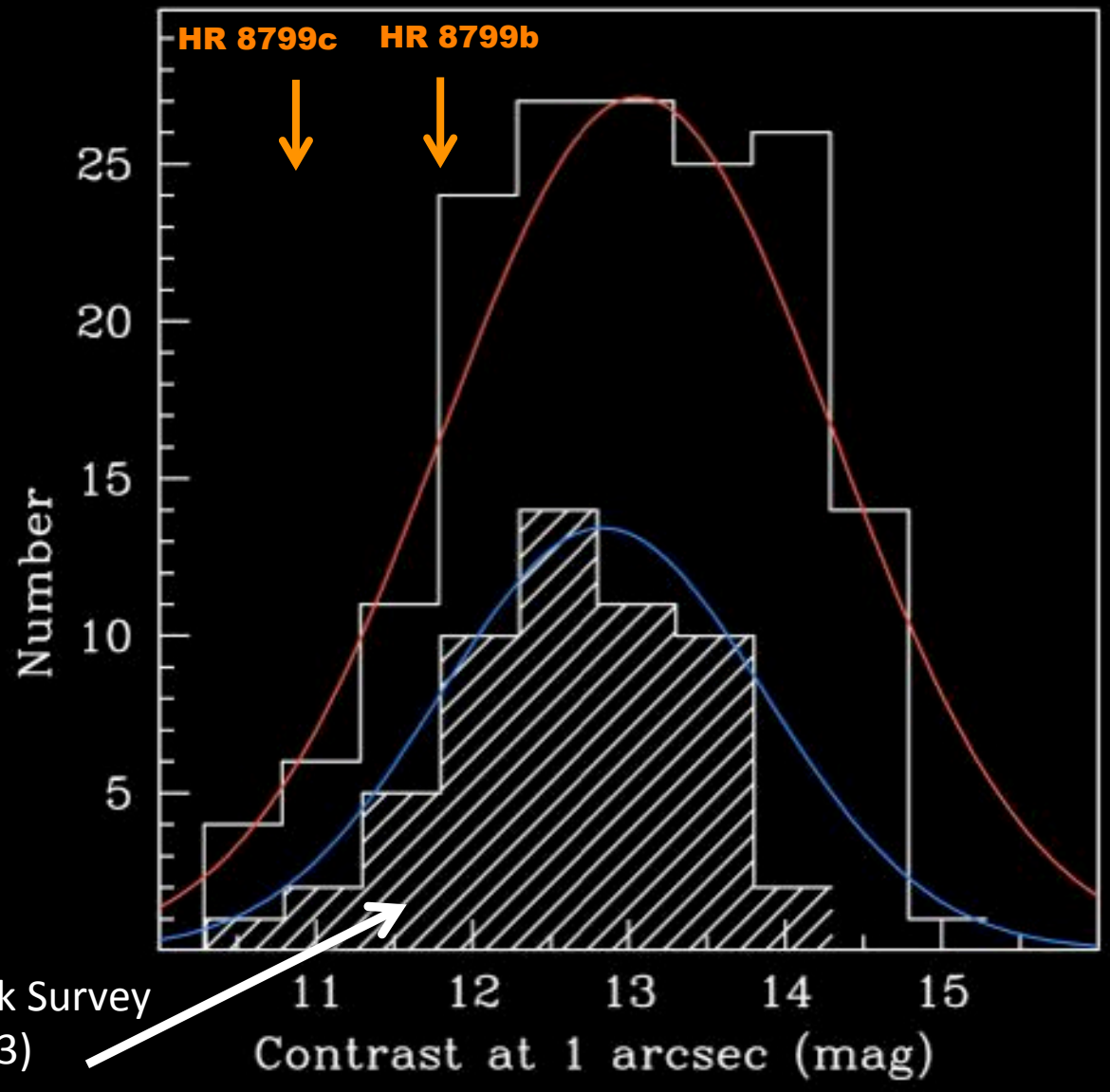


Survey Performance: 5σ K-band Contrast at 1”

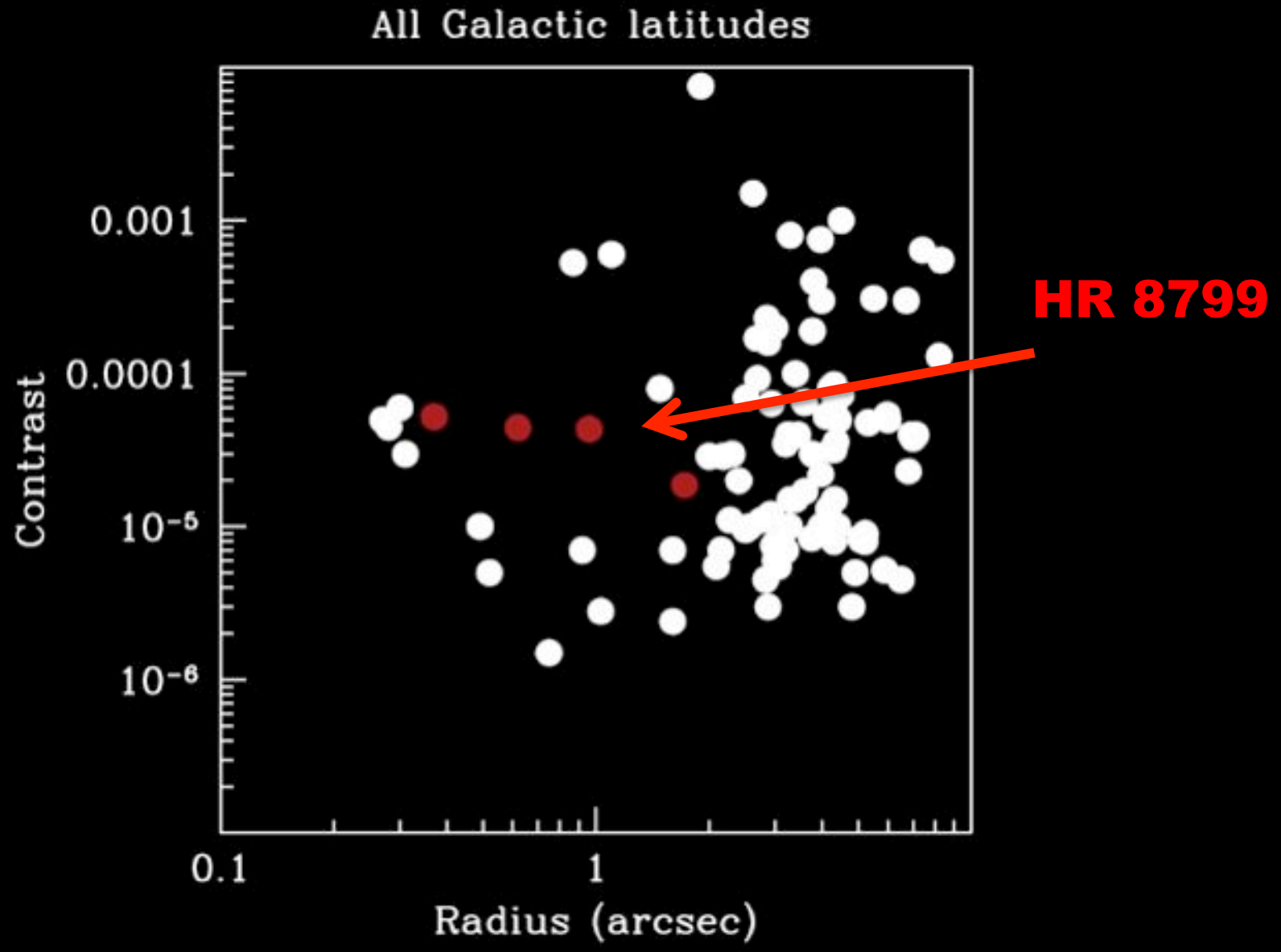


SEEDS Debris Disk Survey
Janson et al (2013)

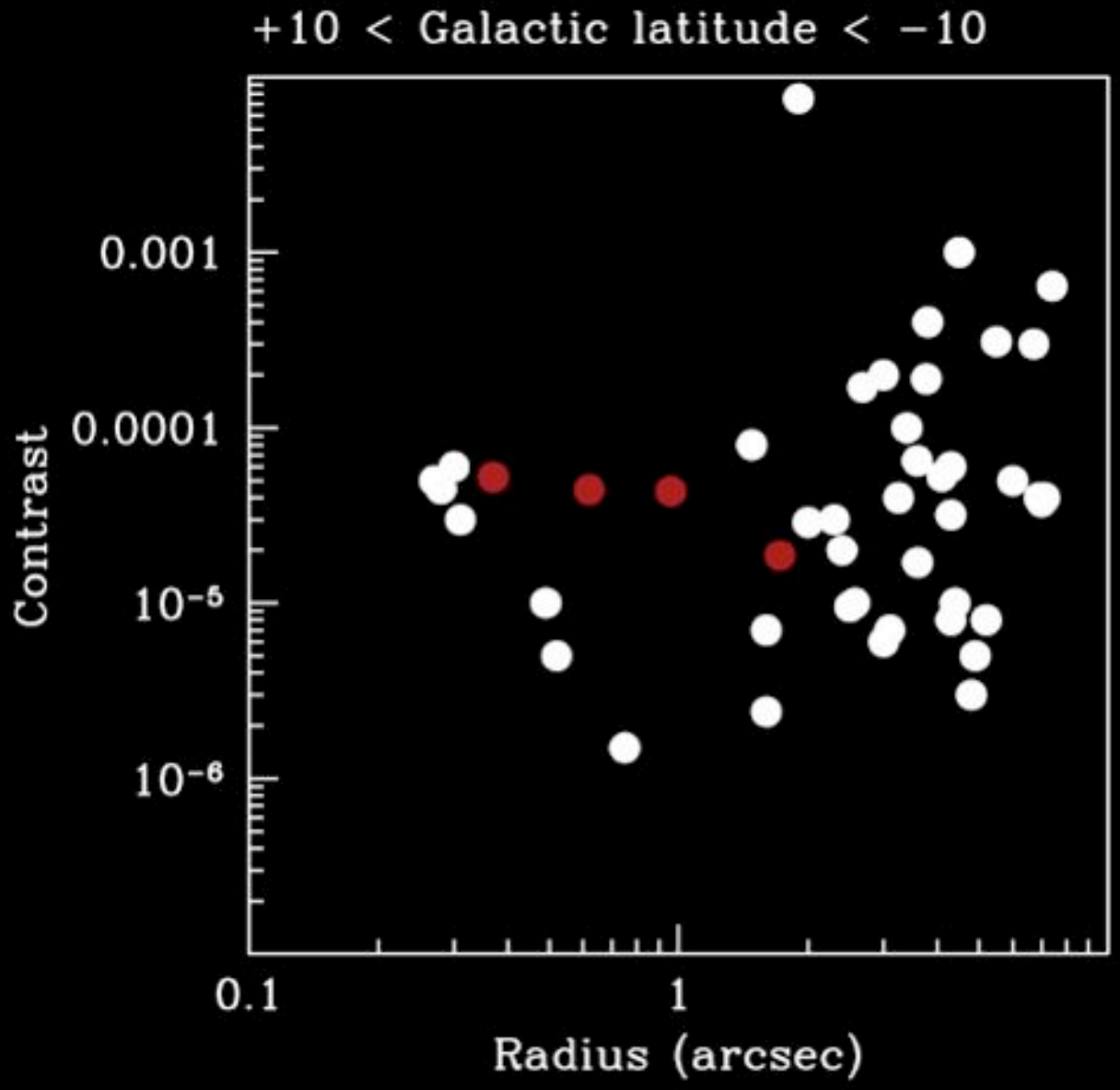
Candidate Companions

103 Candidate Companions to Date

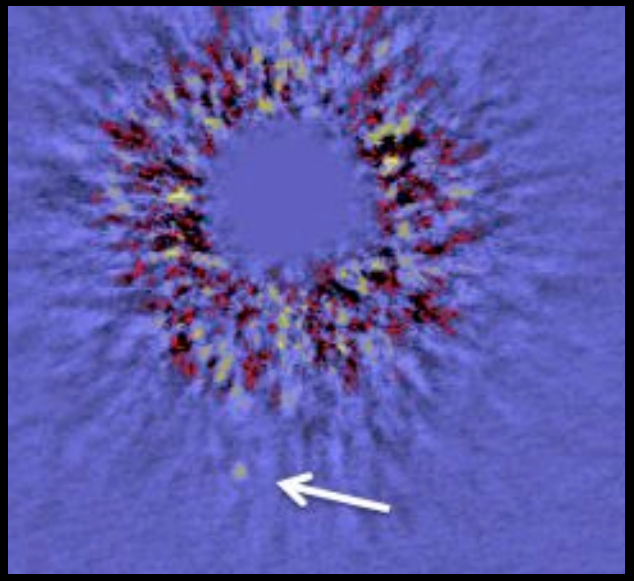
Candidate Companions

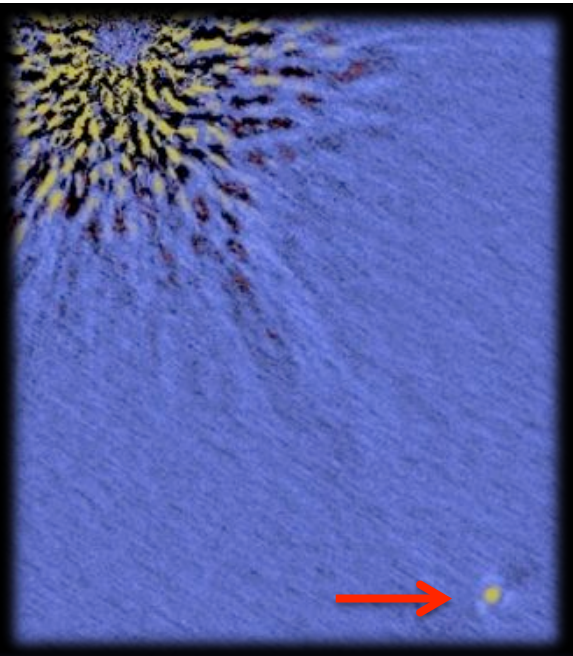


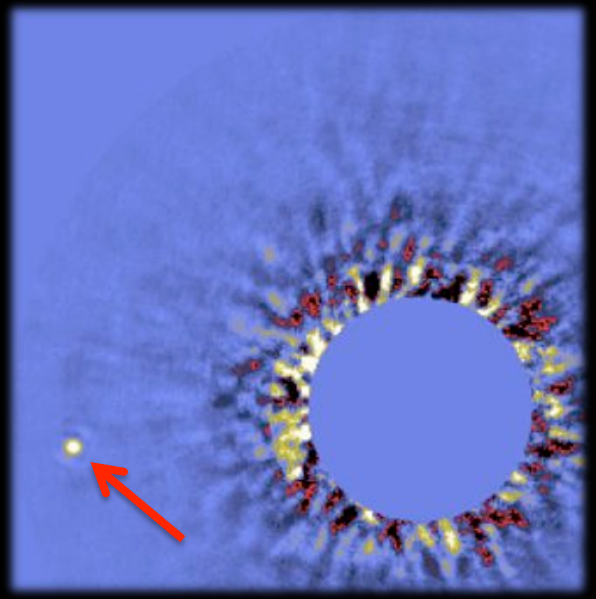
Candidate Companions

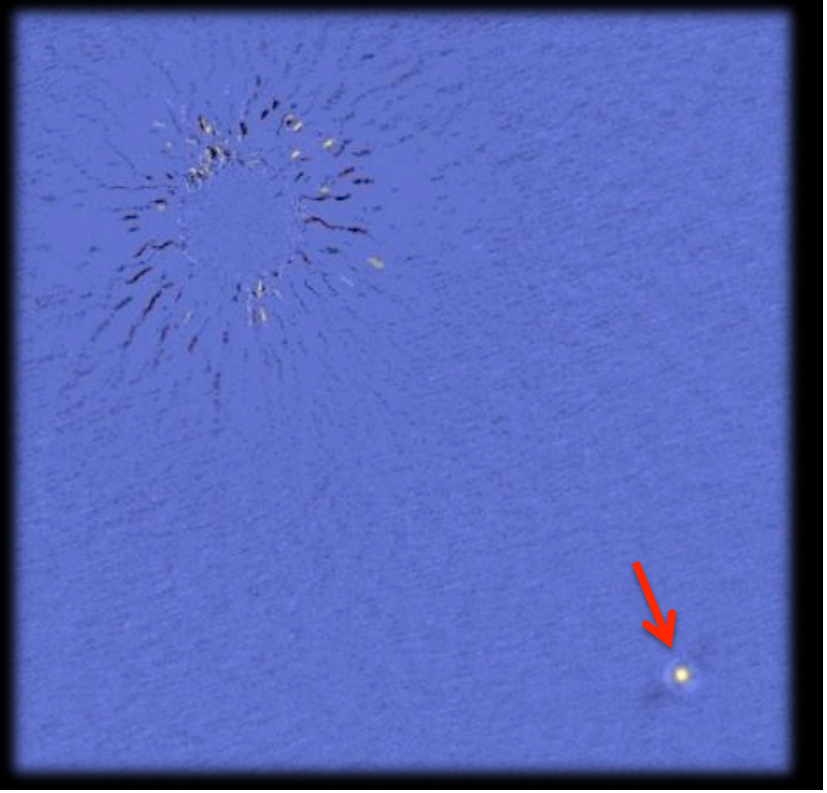


Candidates from Keck









Overview

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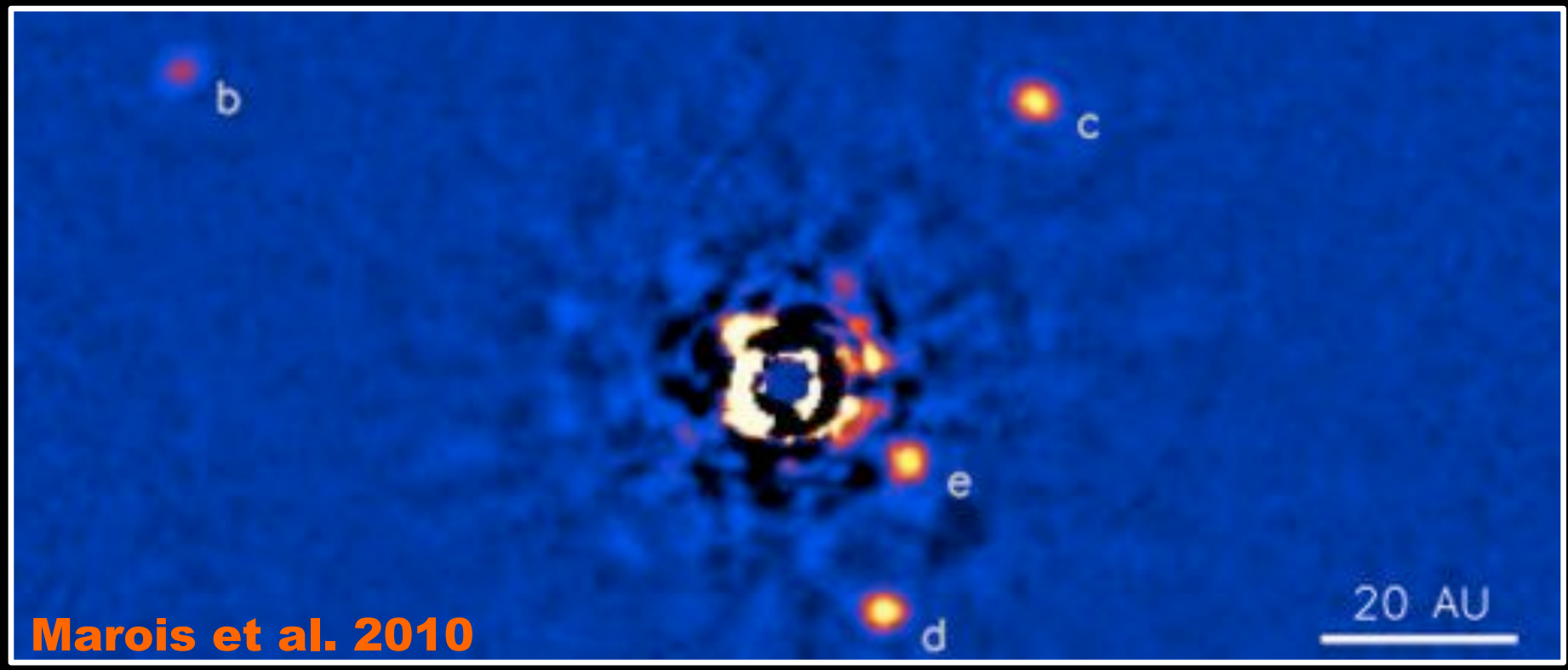
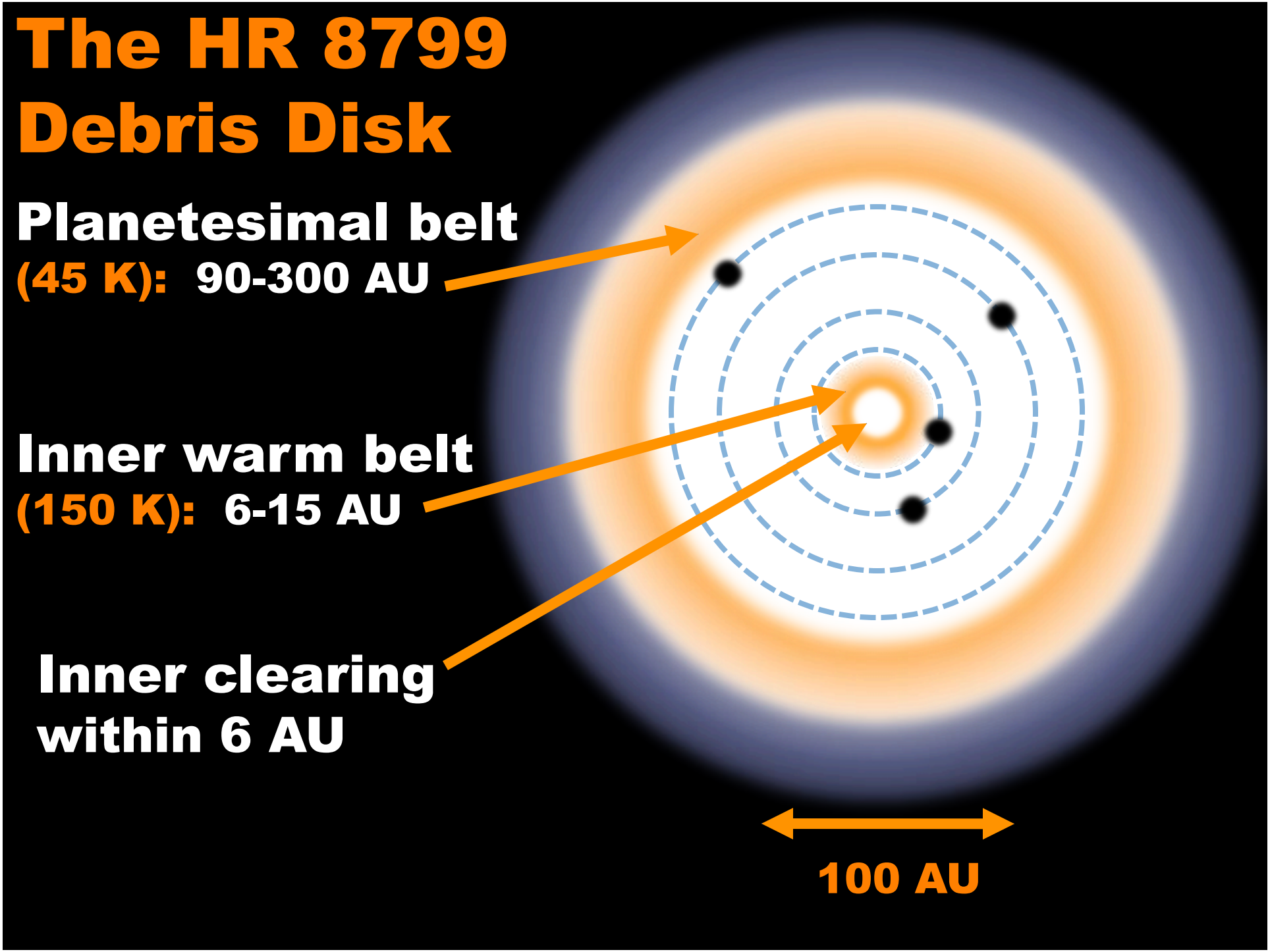
2. Other Debris Disk work.

HR 8799



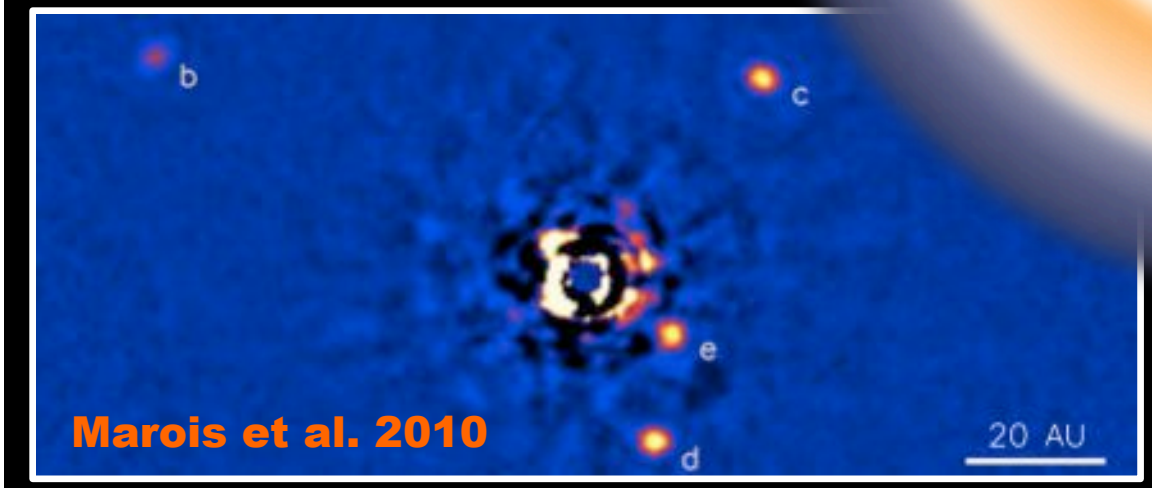
The HR 8799 Debris Disk



The Inner 10 AU of HR 8799

Planetesimal belt
(45 K): 90-300 AU

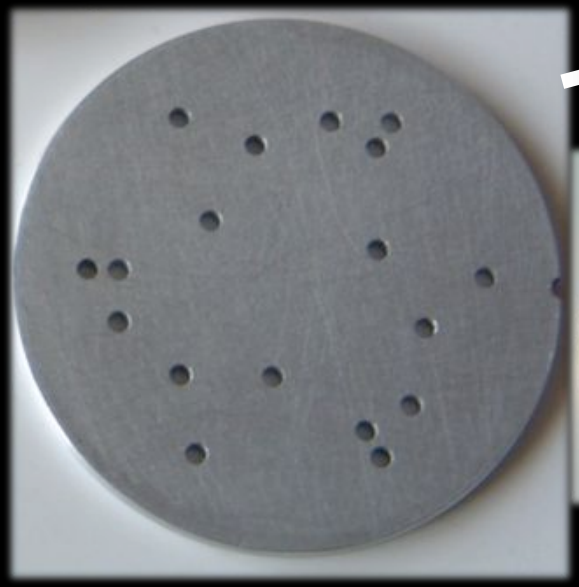
Inner warm belt
(150 K): 6-15 AU



100 AU

Keck L-band Sparse Aperture Masking

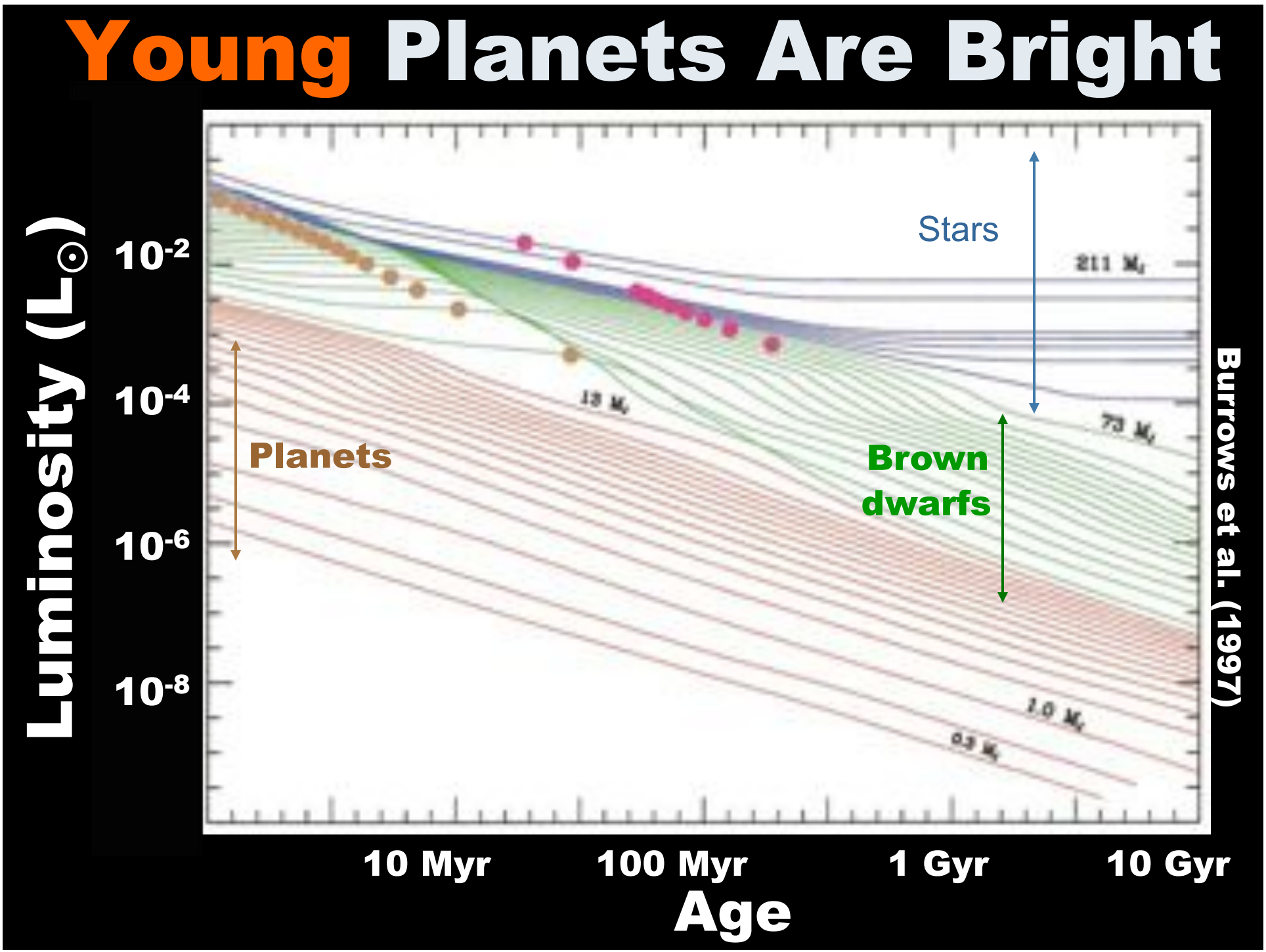
- Several small apertures
- No coronagraph.
- See work by:
  Lacour/Gauchet + Absil



Extremely small resolution:
(10-300 milliarcsec)

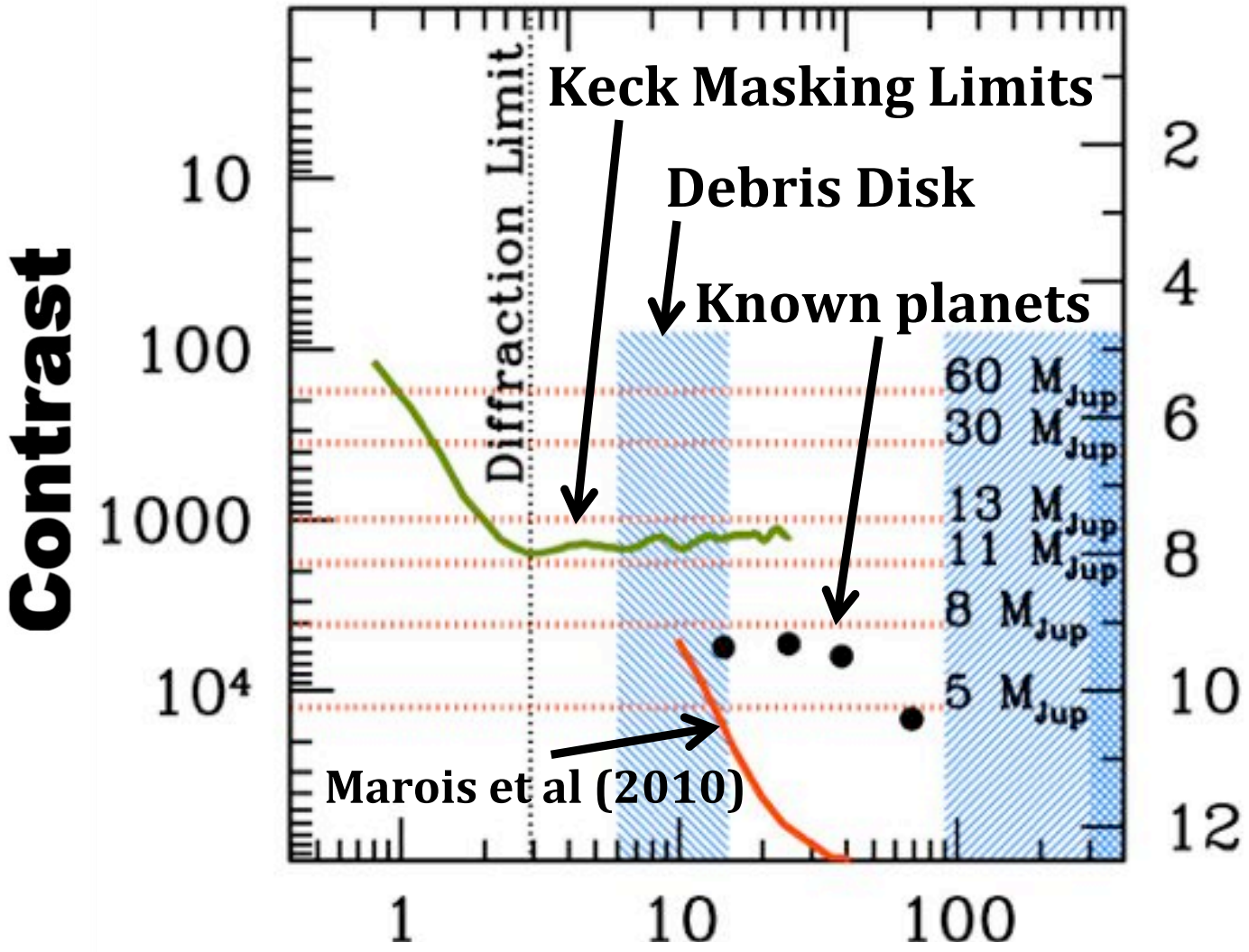
Modest contrast:
(10^2 - 10^3)

Young Planets Are Bright

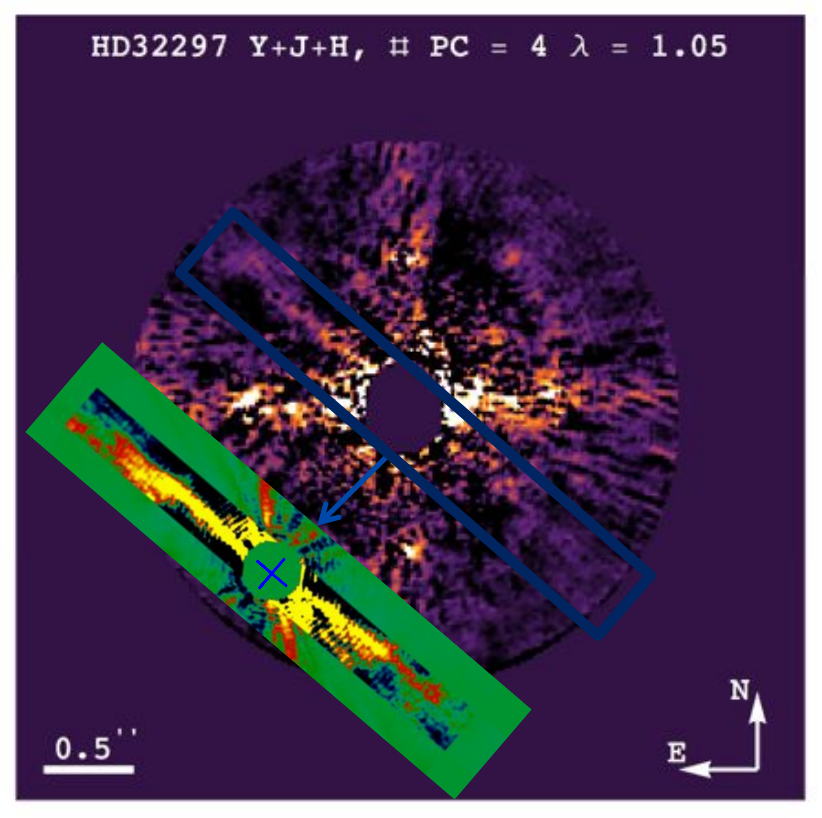


The Inner 10 AU of HR 8799

Hinkley et al. (2011)



HD32297 with Project 1640 at Palomar



- P1640 scattered light YJH imaging.
- Spatially resolved morphology/spectrum

→ Goals:

Density profile,

Grain size distribution

Lebreton, Pueyo, Beichman et al. (in prep)

Conclusions

- **Keck/VLT observations of 262 Stars with 22 μm excess.**
- **The majority of targets have no previous high-contrast observations.**
- **Following 100 candidate companions.**
- **Sparse Aperture Masking will open the inner regions of young systems e.g. β Pic.**